Department of biology

2025-2026

((Theoretical Histology))

Stage (-3-)

LEC- (9)

Nervous system

By

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Nervous system:

- **is highly specialized tissue to employ modifications in membrane electrical potentials to relay signals throughout the body.**
- **Receive stimuli from both internal and external environments which are then analyses and integrated to produce appropriate coordinated responses in various effector organs.**

- **Subdivision of nervous tissues:**

Anatomical subdivisions:

A. ***Central nervous system (CNS)***

1) ***Brain***

2) ***Spinal cord***

B. ***Peripheral nervous system (PNS)***

1) ***Nerves***

2) ***Ganglia (singular, ganglion)***

Structural subdivisions:

A.*Nerve cell (neuron):*

1) **Functional units of the nervous system**; receive, process, store, and transmit information to and from other neurons, muscle cells, or glands.

2) Composed of a **cell body**, **dendrites, axon**

B. Glial cells (neuroglia) (supporting cells)

Structure of typical Neuron:

1. Cell body (Soma): trophic unit

A. *Nucleus*: Large, spherical, usually centrally located in the soma

B. *Cytoplasm:*

- Intermediate filaments (*neurofilaments*), act As a skeleton transportation.
- rough endoplasmic reticulum **(*Nissl bodies*)**, which are the site of protein synthesis.

2-Dendrite(s): **Receptive unit**

3-Axon: **Conductive unit**

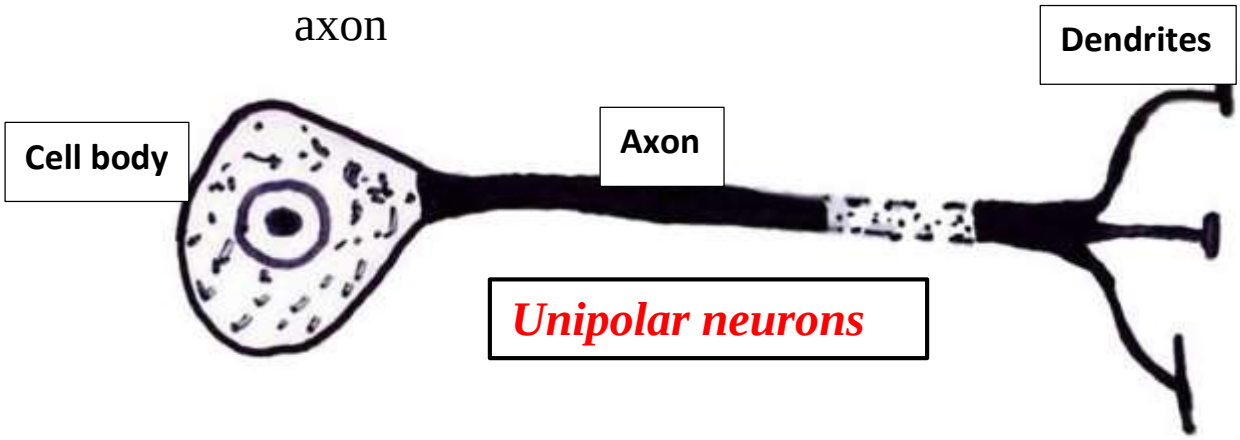
Axon	Dendrites
1- Carries information to another neuron or muscle cell or gland	Carries information to cell body (Soma).
2- Single (one per neuron)	Multiple
3- Relatively long	Relatively short
4- fewer branches than dendrites	highly branched at acute angles More than two processes.
5- Covered by neurolemma made up of Schwann cells	Have receptors for neurotransmitters

Classification of neuron:

Neuron are classified according

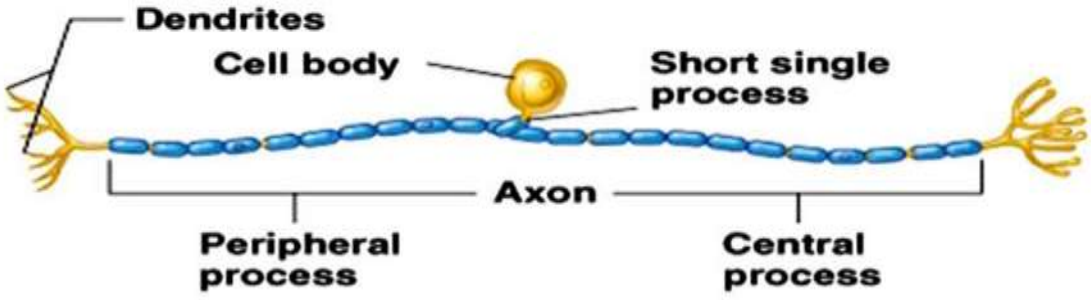
A. Structural classification: number of soma processes (4 types):

1) ***Unipolar neurons:*** *(rare in the adult human)* are found during early embryogenesis. They have one axon



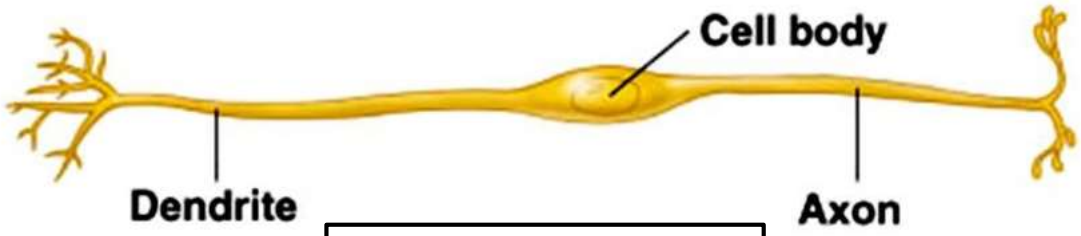
Unipolar neurons

2) Pseudounipolar neurons: have a short single process leaving the cell body



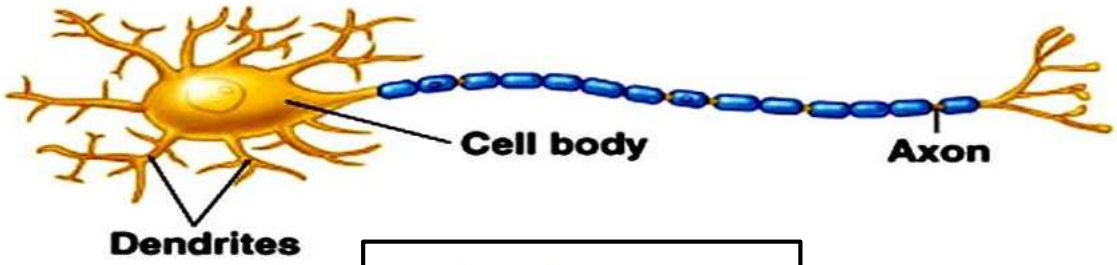
Pseudounipolar neurons

3) Bipolar neurons: single axon and dendrite arise at opposite poles of the cell body. Found only in ***sensory neurons***, such as in the **retina**, **olfactory and auditory systems.**



Bipolar neurons

4) Multipolar neurons: More than two dendrites just one axon ; found in brain, peripheral autonomic nervous system and spinal cord.



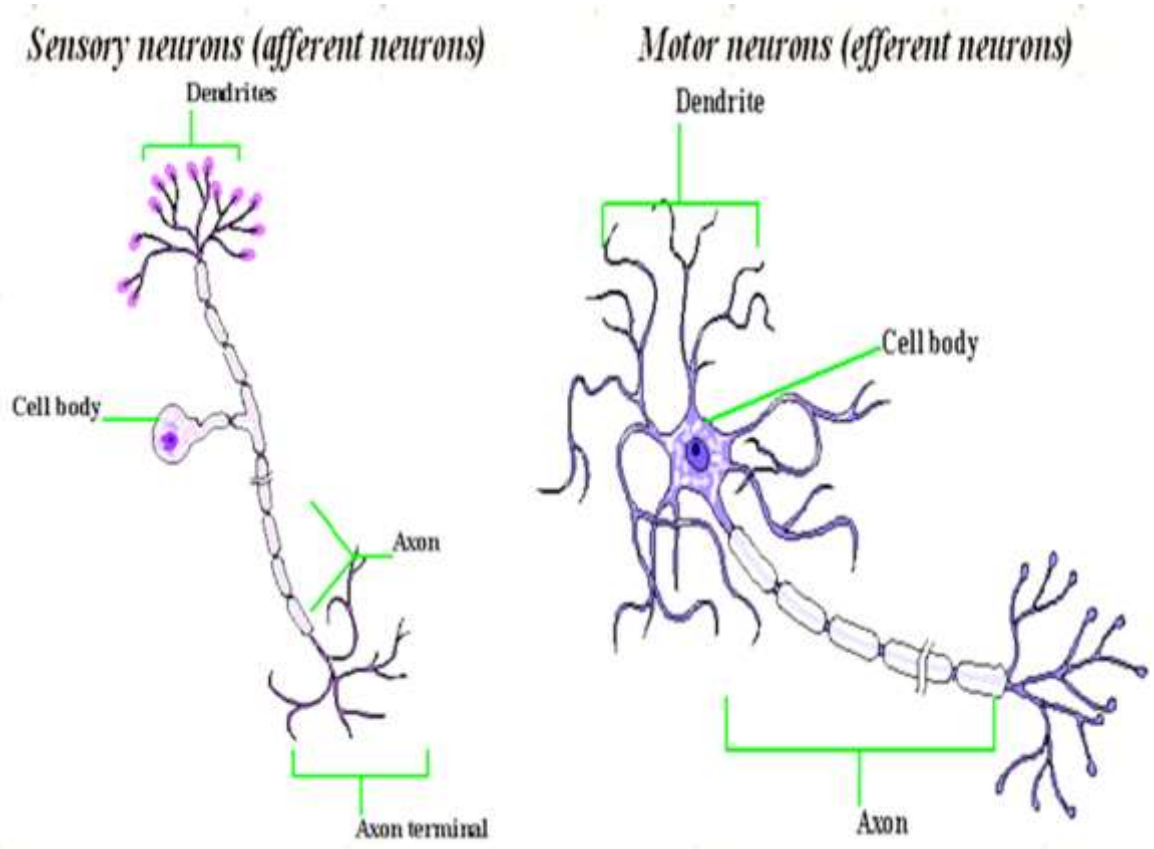
Multipolar neurons

2- Functional classification:

A. ***Sensory neurons (afferent neurons):*** involved in the reception of sensory stimuli from the environment & from within the body.

B. ***Motor neurons (efferent neurons):*** conduct impulses to effectors organs (muscle, exocrine & endocrine glands) and control their functions.

C. ***Interneurons:*** establish interrelationships among other neurons ; Modify and Integrate nerve impulses.



B- Neuroglia *(supporting cells)*

- ♥ **Location:** between neurons
- ♥ **Morphology:** smaller than neuron, have processes (no dendrites and axon) .
- ♥ **Number:** five to ten times of neurons.
- ♥ **Function:** support, protect, nourish neuron, influence neuron's activities and metabolism.

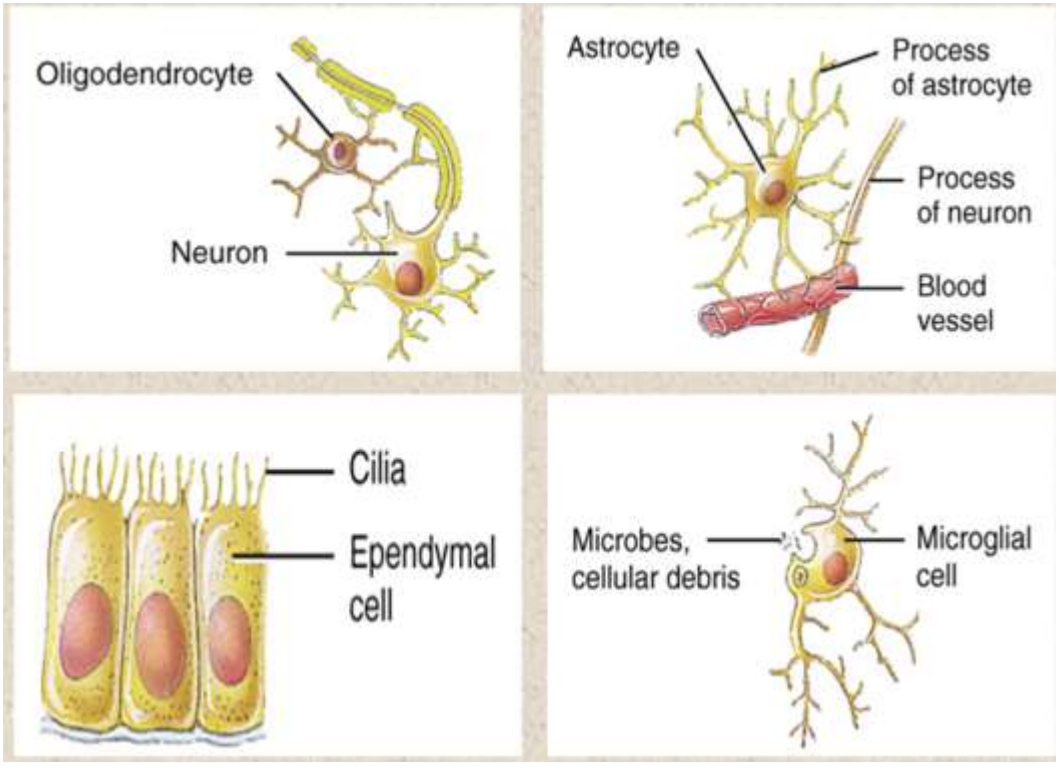
- **Supporting cells in CNS:**

1) ***Astrocytes***

2) ***Oligodendrocytes***

3) ***Microglia***

4) ***Ependymal***



- **Supporting cells in PNS:**

1) **Satellite cells**

2) **Schwann cells**